Claim Listing

1–30. (canceled)

31. (currently amended) A method of forming a multi-layer web in a formation section, comprising the steps of:

forming a first partial web on a first wire of a first wire unit with a first pulp suspension jet supplied by a first headbox at a forward end of the first wire unit;

forming a second partial web in a second wire unit from a second pulp suspension jet supplied by a second headbox, wherein the second pulp suspension jet is supplied to a jaw defined by a second wire of the second wire unit, and a third wire of the second wire unit, the second wire of the second wire unit and the third wire of the second wire unit forming a two-wire stretch which begins with the jaw, and wherein a forward end of the two-wire stretch is defined where the second wire of the second wire unit, and the third wire of the second wire unit meet;

performing non-pulsating dewatering of the second partial web in a first dewatering zone of the two-wire stretch of the second wire unit by moving the second wire of the second wire unit, and the third wire of the second wire unit, in the two-wire stretch over a curved cap of at least one fixed first formation shoe <u>having a leading edge and</u> located at the forward end of the two-wire stretch such that the cap engages one side of the two-wire stretch, and drawing water <u>in an area following after the leading edge of the at least one fixed first formation shoe</u> with under-pressure through holes or gaps which extend through the cap wherein said holes or gaps are essentially lengthwise in [[the]] <u>a</u> machine direction <u>and wherein the leading edge of the at least one first fixed formation shoe does not remove water from the second partial web in the first dewatering zone;</u>

after the non-pulsating dewatering, performing pulsating dewatering in a second dewatering zone of the two-wire stretch of the second wire unit with fixed dewatering lists placed against a side of the two-wire stretch, the lists extending in the cross machine direction and forming cross machine direction gaps therebetween, and applying under-pressure through said gaps to the two-wire stretch; and

bringing one of the second wire of the second wire unit or the third wire of the second wire unit, having the second partial web thereon, into engagement with the first wire of the first forming unit having the first partial web thereon to join the first partial web to the second partial web at a joint.

32. (previously presented) The method of claim 31 wherein the pulsating dewatering in the second dewatering zone of the two-wire stretch of the second wire unit is effected with loadable dewatering lists loaded in a controlled manner on a side of the two-wire stretch opposite the fixed dewatering lists, the loadable dewatering lists being positioned opposite the gaps between the fixed dewatering lists.

33. (previously presented) The method of claim 31 wherein in the step of forming a first partial web on the first wire of the first wire unit with the first pulp suspension jet, the first partial web is formed on a fourdrinier wire of a fourdrinier wire unit, the fourdrinier wire forming a loop, and the loop defining an interior.

34. (previously presented) The method of claim 33, wherein the first pulp suspension jet applies a fiber pulp to the fourdrinier wire, and further comprising the step of dewatering the fiber pulp on the fourdrinier wire in a first fourdrinier dewatering zone and in a second, successive fourdrinier dewatering zone.

35. (previously presented) The method of claim 34, wherein the step of dewatering in the first fourdrinier dewatering zone is accomplished as non-pulsating dewatering with a fixed fourdrinier formation shoe having a leading edge, and a curved cap, which fixed fourdrinier formation shoe is located interior to the loop at an impact point formed by the first pulp suspension jet with the fourdrinier wire, and wherein the non-pulsating dewatering takes place by moving the fourdrinier wire over the curved cap which is placed against an inner surface of the fourdrinier wire, and wherein the fiber pulp is non-pulsatingly dewatered in the first dewatering zone by drawing water from the fiber pulp through openings in the cap which extend through the cap, and effecting the dewatering of the fiber pulp with an under-pressure acting through the openings of the cap in an area following after the leading edge.

36. (previously presented) The method of claim 35, wherein the step of dewatering in the second fourdrinier dewatering zone comprises performing pulsating dewatering with a suction box having a list cap placed against an inner surface of the fourdrinier wire loop interior, the suction box being located at an output end of the fourdrinier wire unit and further applying under-pressure with the suction box through openings in the list cap, whereby the fiber pulp traveling on the fourdrinier wire is subjected to pulsating dewatering in the area of the suction box.

37. (previously presented) The method of claim 31 wherein in the step of forming the first partial web on the first wire with the first pulp suspension jet comprises supplying the first pulp suspension jet into a jaw at a forward end of the first wire unit, the jaw being defined by the first wire and a superpositioned wire forming a first two-wire stretch, the first two wire stretch defining a beginning where the first wire and the superpositioned wire first meet.

38. (previously presented) The method of claim 37 wherein dewatering of the first partial web is accomplished in a first dewatering zone and a second successive dewatering zone in the first two-wire stretch of the first wire unit.

39. (currently amended) The method of claim 38, wherein dewatering is accomplished as non-pulsating dewatering in the first dewatering zone of the first wire unit which is at the beginning of the first two-wire stretch of the first wire unit, said non-pulsating dewatering being accomplished with a further fixed formation shoe which has a leading edge and a curved cap, the further fixed formation shoe being placed against an inner surface of the first wire, ~~wherien~~ wherein the further fixed formation shoe cap has portions defining openings which extend through the cap wherein said openings are essentially lengthwise in the machine direction; and

applying under-pressure to the cap openings whereby fiber pulp from the first pulp suspension jet traveling in between the first wire and the superpositioned wire is subjected to a non-pulsating dewatering area following after the leading edge of the further fixed formation shoe and wherein the leading edge of the further fixed formation shoe does not remove water from the first partial web in the first dewatering zone.

40. (previously presented) The method of claim 39, wherein dewatering is accomplished as pulsating dewatering in the second dewatering zone of the first wire unit of the first two-wire stretch of the first wire unit, said pulsating dewatering being accomplished with fixed dewatering lists placed against one side of the first two-wire stretch in a cross machine direction; and further comprising the step of applying under-pressure through cross machine direction gaps defined between the lists and subjecting the fiber pulp between the first wire and the superpositioned wire to pulsating dewatering.

41. (previously presented) The method of claim 40, further comprising the step of further accomplishing dewatering in the second dewatering zone of the first wire unit by loading in a controlled manner movable lists located on an opposite side of the second two-wire stretch in relation to the fixed dewatering lists at the gaps between the fixed dewatering lists.

42. (previously presented) The method of claim 31 wherein the at least one fixed first formation shoe cap defines a total surface area and wherein water is drawn through 50-90 % of the total surface area of the cap.

43. (previously presented) The method of claim 31 wherein the at least one fixed first formation shoe draws water through the openings in the cap along an angle of 30-75 degrees between central axes of the openings and a tangent to the cap's outer surface obliquely against a traveling direction defined by the first formation wire.

44. (previously presented) The method of claim 31 wherein the two-wire stretch moves about a radius of curvature of 1-5 m as the two–wire stretch moves over the at least one fixed first formation shoe.

45. (previously presented) The method of claim 31 wherein non-pulsating dewatering is performed by the at least one fixed first formation shoe in such a way that the overlap angle of the formation wire traveling over the first formation shoe is 3 degrees to 45 degrees in an area defined by the cap.

46. (currently amended) A multi-layer web formation section comprising:

a first wire unit for forming a first partial web, the first wire unit having a first wire, a forward end, and an output end;

a first headbox, arranged to supply a first pulp suspension jet to the forward end of the first wire unit;

a second wire unit succeeding the first wire unit, the second wire unit having a two-wire stretch defined by a second wire and a third wire, the second wire and the third wire forming a closing jaw at a forward end where the second wire and the third wire come together, and forming an output end where the second wire and the third wire are separated from one another, the two-wire stretch defining a first side and a second side;

a second headbox located at the forward end of the two-wire stretch of the second wire unit and which is arranged to supply a second pulp suspension jet into the closing jaw;

a joint formed in between the second wire unit and the first wire so that a second partial web formed in the second wire unit will join to a first partial web carried on the first wire;

a first dewatering zone defined by at least one fixed first formation shoe having a leading edge and a curved cap positioned on one side and at the forward end of the two-wire stretch, the at least one fixed first formation shoe having the curved cap placed against the first side or the second side of the two-wire stretch, the cap having portions defining openings which extend through the cap, which openings are connected to a source of under-pressure, wherein the openings are formed by holes or by gaps extending essentially in the lengthwise direction of the machine, the at least one fixed first formation shoe arranged such that fiber pulp traveling in-between the second and third wires of the two-wire stretch is subjected to non-pulsating dewatering in an area following after the leading edge of the <u>at least one fixed</u> first formation shoe <u>and wherein</u>

the leading edge of the at least one fixed first formation shoe is arranged not to remove water from the fiber pulp traveling in-between the second and third wires of the two-wire stretch; and

a second dewatering zone positioned after the first dewatering zone along the two-wire stretch of the second wire unit and defined by fixed dewatering cross machine direction extending lists placed against the first side or the second side of the two-wire stretch, the lists defining gaps between the lists, the gaps connected to a source of under-pressure such that a fiber pulp traveling in between the second forming wire and the third forming wire is subjected to pulsating dewatering by the fixed dewatering lists and by under-pressure.

47. (previously presented) The multi-layer web formation section of claim 46, wherein the second dewatering zone of the second wire unit also comprises loadable dewatering lists of the type which are structured so as to be loaded in a controlled manner, and which are located on the first side or the second side of the two-wire stretch which is opposite in relation to the fixed dewatering lists, and positioned at the gaps between the fixed dewatering lists.

48. (previously presented) The multi-layer web formation section of claim 46, wherein the first wire unit is a fourdrinier wire unit, and the first headbox is arranged to apply the pulp suspension jet on to the first wire which is a fourdrinier wire, the fourdrinier wire defining an inner surface.

49. (previously presented) The multi-layer web formation section of claim 48 wherein the fourdrinier wire unit has two successive dewatering zones.

50. (currently amended) The multi-layer web formation section of claim 49, wherein the fourdrinier wire unit two successive dewatering zones comprise a first dewatering zone and a second dewatering zone, and wherein the first [[first]] dewatering zone is defined by a fixed fourdrinier formation shoe which is located at the beginning of the fourdrinier wire unit at a point where the pulp suspension jet is arranged to impact the fourdrinier wire, the fixed fourdrinier formation shoe having a curved cap placed against the inner surface of the fourdrinier wire and having portions defining openings extending through the cap wherein said openings are holes or gaps which extend essentially lengthwise in the machine direction, the openings connected to a source of under-pressure, so that the fixed fourdrinier formation shoe is arranged to subject a fiber pulp traveling on the fourdrinier wire to non-pulsating dewatering in an area following after a leading edge of the fixed fourdrinier formation shoe and wherein the leading edge of the fixed fourdrinier formation shoe is arranged not to remove water from the fiber pulp traveling on the fourdrinier wire.

51. (previously presented) The multi-layer web formation section of claim 50, wherein the second dewatering zone of the fourdrinier wire unit is formed by a suction box which is located at an output end of the fourdrinier wire unit, and wherein the suction box has a list cap which is positioned against the inner surface of the fourdrinier wire, portions of the list cap defining openings which are connected to a source of under-pressure so that a fiber pulp traveling on the fourdrinier wire is subjected to pulsating dewatering by the suction box.

52. (previously presented) The multi-layer web formation section of claim 46, wherein the first wire unit is a wire unit equipped with a superpositioned wire forming a first two-wire stretch with the first wire and forming a first jaw at the forward end of the first wire unit, the first two-wire stretch defining a beginning where the first wire and the superpositioned wire first meet, and wherein the first headbox is arranged to supply the first pulp suspension jet into the first jaw.

53. (previously presented) The multi-layer web formation section of claim 52, wherein there is a first dewatering zone, and a second dewatering zone after the first dewatering zone in the first two-wire stretch of the first wire unit.

54. (currently amended) The multi-layer web formation section of claim 53, wherein the first dewatering zone of the first wire unit is formed by a further fixed formation shoe having a leading edge and located at the beginning of the first two-wire stretch of the first wire unit, and wherein the further fixed formation shoe has a curved cap placed against an inner surface defined by the first wire, the further fixed formation shoe having portions defining openings extending through the cap, wherein said openings are holes or gaps which extend essentially lengthwise in a machine direction, the openings connected to a source of under-pressure, so that the further fixed formation shoe is arranged to subject fiber pulp traveling between the first forming wire and the superpositioned forming wire to non-pulsating dewatering in an area following after the leading edge of the further fixed formation shoe.

55. (previously presented) The multi-layer web formation section of claim 54, wherein the second dewatering zone of the two-wire stretch of the first wire unit is formed by first fixed dewatering cross machine direction extending lists which are placed against one side of the first two-wire stretch, the lists defining cross machine direction extending gaps between the lists, the gaps connected to a source of under-pressure so that the fiber pulp traveling in between the first forming wire and the superpositioned wire is subjected to pulsating dewatering by the first fixed dewatering lists and by under-pressure.

56. (previously presented) The multi-layer web formation section of claim 55, wherein the second dewatering zone of the first wire unit further comprises first loadable dewatering lists, of the type which are mounted so as to be loaded in a controlled manner, and which are located on the opposite side of the two-wire stretch in relation to the first fixed dewatering lists at the gaps between the first fixed dewatering lists.

57. (previously presented) The multi-layer web formation section of claim 54, wherein the openings which extend through the further fixed formation shoe cap are 50-90 % of a total surface area defined by the cap.

58. (previously presented) The multi-layer web formation section of claim 46, wherein the openings which extend through the cap are orientated obliquely against a traveling direction defined by the first formation wire, so that the holes form an angle of 30-75 degrees between central axes of the holes and a tangent to an outer surface defined by the cap.

59. (previously presented) The multi-layer web formation section of claim 46, wherein the cap has a radius of curvature of 1-5 m.

60. (previously presented) The multi-layer web formation section of claim 50 wherein the fixed fourdrinier formation shoe has a radius of curvature of 5-20 m.

61. (previously presented) The multi-layer web formation section of claim 46 wherein the first formation wire has an overlap angle of 3-45 degrees with respect to an area defined by the cap of the first fixed formation shoe.

62. (currently amended) A method of forming a multi-layer web in a formation section, comprising the steps of:

forming a first partial web on a first wire of a first wire unit with a first pulp suspension jet supplied by a first headbox at a forward end of the first wire unit;

forming a second partial web in a second wire unit from a second pulp suspension jet supplied by a second headbox, wherein the second pulp suspension jet is supplied to a jaw defined by a second wire of the second wire unit, and a third wire of the second wire unit, the second wire of the second wire unit, and the third wire of the second wire unit forming a two-wire stretch which begins with the jaw, and defining a forward end of the two wire stretch where the second wire of the second wire unit, and the third wire of the second wire unit meet;

non-pulsatingly dewatering the second partial web in a first dewatering zone of the two-wire stretch of the second wire unit by moving the second wire of the second wire unit, and the third wire of the second wire unit, in the two-wire stretch, over a curved cap of a least one fixed first formation shoe <u>having a leading edge and</u> located at the forward end of the two-wire stretch such that the cap engages one side of the two-wire stretch, and drawing water with under-pressure through holes or gaps which extend through the cap and are essentially lengthwise in [[the]] <u>a</u> machine direction <u>and wherein the leading edge of the at least one fixed first formation shoe does not remove water from the second partial web in the first dewatering zone</u>;

after the non-pulsating dewatering, pulsatingly dewatering in a second dewatering zone of the two-wire stretch of the second wire unit with fixed dewatering lists placed against a side of the two-wire stretch, the lists extending in the cross machine direction and forming cross machine direction gaps therebetween, and through said gaps applying under-pressure to the two-wire stretch;

bringing one of the second wire of the second wire unit, or the third wire of the second wire unit, having the second partial web thereon into engagement with the first

wire of the first forming unit having the first partial web thereon to join the first partial web to the second partial web at a joint;

wherein pulsating dewatering in the second dewatering zone of the two-wire stretch of the second wire unit is effected with loadable dewatering lists loaded in a controlled manner on a side of the two-wire stretch opposite the fixed dewatering list, the loadable dewatering lists positioned opposite the gaps between the fixed dewatering lists;

wherein in the step of forming the first partial web on the first wire with the pulp suspension jet is by supplying the suspension jet into a jaw at a forward end of the first wire unit, the jaw formed by the first wire and a superpositioned wire forming a first two-wire stretch, the first two wire stretch defining a beginning where the first wire and the superpositioned wire first meet;

wherein dewatering of the first partial web formed on of the first wire unit is accomplished in a first dewatering zone of the first wire unit as non-pulsating dewatering at the beginning of the first two-wire stretch of the first wire unit with a further fixed formation shoe which has a leading edge and a curved cap, the further fixed formation shoe being placed against an inner surface of the first wire; and

applying under-pressure through portions of the further fixed formation shoe cap forming holes or gaps which extend through the cap and are essentially lengthwise in the machine direction, ~~openings~~ which holes or gaps extend through the further fixed formation shoe cap whereby fiber pulp from the first pulp suspension jet traveling in between the first wire and the ~~second~~ superpositioned wire, is subjected to a non-pulsating dewatering area following after the leading edge of the further fixed formation shoe and wherein the leading edge of the further fixed formation shoe does not remove water from the first partial web in the first dewatering zone of the first wire unit;

wherein pulsating dewatering of the first partial web formed on the first wire unit is

accomplished in a second successive dewatering zone in the first two-wire stretch of the first wire unit with fixed dewatering lists placed against one side of the first two-wire stretch in a cross machine direction, and applying under-pressure through cross machine direction gaps defined between the lists and subjecting the fiber pulp between the first wire and the superpositioned wire formation wire to pulsating dewatering; and further accomplishing dewatering by loading in a controlled manner movable lists located on an opposite side of the first two-wire stretch in relation to the fixed dewatering lists at the gaps between the fixed dewatering lists.